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1 Claims

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3 1. A transparent assembly locatable in a window
4 frame having a rebate, the assembly having a
5 transparent panel and one or more high tensile
6 strength flexible material reinforcement pieces
7 extending laterally from the panel to provide
8 non-rigid attachment of the assembly to a
9 subframe and/or wall, wherein the attachment
10 allows movement of the assembly within the
11 rebate.

12

13 2. An assembly as claimed in Claim 1 wherein the
14 or each reinforcement piece is woven fabric
15 material, woven glass fibre material, polyester
16 fibre material or metal, or a combination
17 thereof.

18

19 3. An assembly as claimed in Claim 1 or Claim 2
20 wherein the reinforcement piece(s) laterally
21 extend around the periphery of the panel.

22

23 4. An assembly as claimed in Claim 3 wherein the
24 reinforcement piece(s) laterally extend wholly
25 or substantially along the periphery of the
26 panel.

27

28 5. An assembly as claimed in any one of the
29 preceding Claims wherein the reinforcement
30 pieces are in the form of a series of discrete
31 straps.

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- 1 6. An assembly as claimed in Claim 5 wherein the
2 reinforcement pieces are webbing.
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- 4 7. An assembly as claimed in any one of the
5 preceding Claims wherein the transparent panel
6 comprises at least one glass layer and at least
7 one resin layer to form a lamination, and
8 wherein the or each reinforcement piece extends
9 from a resin layer.
10
- 11 8. An assembly as claimed in Claim 7 wherein the
12 assembly has a glass/resin/glass lamination.
13
- 14 9. An assembly as claimed in Claim 7 or 8 wherein
15 the or each resin is layer formed from
16 polyurethane clear cast resin.
17
- 18 10. An assembly as claimed in Claim 9 wherein the
19 resin is Naftolan.
20
- 21 11. An assembly as claimed in any one of Claims 7
22 to 10 wherein the or each resin layer includes
23 directional fibre reinforcement at or near each
24 edge of the or each resin layer, and wherein
25 the or each reinforcement piece extends around
26 the fibre reinforcement.
27
- 28 12. An assembly as claimed in Claim 11 wherein the
29 fibre reinforcements are unidirectional glass
30 fibres, whose direction follows the edge
31 direction of the resin layer.
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- 1 13. An assembly as claimed in Claim 11 or Claim 12
2 wherein the fibre reinforcements are cast in
3 the resin layer simultaneously with casting of
4 the resin.
5
- 6 14. An assembly as claimed in any one of Claims 1
7 to 6 wherein the transparent panel comprises
8 one or more polycarbonate and/or PET layers.
9
- 10 15. An assembly as claimed in Claim 14 wherein the
11 panel includes one or more glass layers
12 laminated with the or each polycarbonate and/or
13 PET layer.
14
- 15 16. An assembly as claimed in Claim 14 or Claim 15
16 wherein the assembly has a plurality of
17 reinforcement pieces, and the panel has a
18 series of apertures at or near its periphery
19 through which the reinforcement pieces pass.
20
- 21 17. An assembly as claimed in any one of the
22 preceding Claims wherein the non-rigid
23 attachment is provided by the or each
24 reinforcement piece being stretchable.
25
- 26 18. An assembly as claimed in any one of the
27 preceding Claims wherein the non-rigid
28 attachment is provided by the or each re-
29 inforcement piece being slack between the
30 lamination and the subframe and/or wall.
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1 19. An assembly as claimed in any one of the
2 preceding Claims wherein the assembly is a
3 window.
4

5 20. An assembly as claimed in any one of the
6 preceding Claims wherein any shock loading on
7 the assembly is wholly or substantially not
8 passed to or through the rebate.
9

10 21. A blast-resistant composite material comprising
11 at least one layer of polyurethane clear cast
12 resin having at least one reinforcement piece
13 extending wholly or substantially across the
14 resin layer.
15

16 22. A material as claimed in Claim 21 wherein the
17 or each reinforcement piece is a strip or bar.
18

19 23. A material as claimed in Claim 21 or Claim 22
20 wherein the material has a series of
21 reinforcement pieces forming a grid-like
22 structure wholly or substantially across the
23 composite material.
24

25 24. A material as claimed in any one of Claims 21
26 to 23 wherein the or each reinforcement piece
27 is one or more of woven roving, webbing,
28 webbing material or metal.
29

30 25. A material as claimed in any one of Claims 21 to
31 24 wherein the material is a one piece
32 assembly.

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- 1
- 2 26. A wall-reinforcement assembly for a wall having
- 3 an adjacent floor and ceiling, comprising a
- 4 first wall-adjacent layer formed wholly or
- 5 substantially of fibre reinforced composite
- 6 flexible material, and a second layer
- 7 comprising one or more high tensile strength
- 8 flexible material reinforcement pieces, wherein
- 9 at least one of said reinforcement pieces is
- 10 secured to the floor and/or the ceiling.
- 11
- 12 27. An assembly as claimed in Claim 26 wherein the
- 13 reinforcement pieces are secured to a strong
- 14 floor and/or strong part of the ceiling.
- 15
- 16 28. An assembly as claimed in Claim 26 or Claim 27
- 17 wherein the first composite layer is a sheet of
- 18 glass fibre reinforced plastic or Kevlar
- 19 material, either loose or in resin, which is
- 20 able to extend across the area of the wall to
- 21 be reinforced.
- 22
- 23 29. An assembly as claimed in any one of Claims 26
- 24 to 28 wherein the pieces of the second layer
- 25 comprise a series of parallel straps.
- 26
- 27 30. An assembly as claimed in any one of Claims 26
- 28 to 29 wherein the assembly includes a third
- 29 layer adapted to provide an internal finished
- 30 layer.
- 31

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1 31. An impact-resistant system comprising the
2 conjunction or combination of an assembly as
3 claimed in any one of Claims 1 to 20 and an
4 assembly as claimed in any one of Claims 26 to
5 30.

6
7 32. A system as claimed in Claim 31 wherein the
8 laminated transparent assembly is in a form of
9 a window, and wherein the flexible material
10 reinforcement pieces of the wall-reinforcement
11 assembly combine with the flexible material
12 reinforcement pieces of the window assembly.

13
14 33. A system as claimed in Claim 31 wherein the
15 material reinforcement pieces of a wall
16 reinforcement assembly extend internally
17 through the laminated transparent assembly,
18 such that the reinforcement pieces are secured
19 by the cast resin in the window, and are of
20 sufficient length to enable the pieces to be
21 secured at fixing points at the top and bottom
22 of a wall being reinforced by the assembly.

23
24 34. A system as claimed in any one of Claims 31 to
25 33 wherein the transparent assembly is located
26 in a frame, and one end of the reinforcement
27 pieces of the wall-reinforcement assembly are
28 secured to the frame.

29
30 35. An optically transparent composite material
31 comprising at least one glass/resin/glass layer
32 lamination, wherein the resin is a polyurethane

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1 clear cast resin having optical fibre-
2 reinforcement therein.

3

4 36. A material as claimed in Claim 35 wherein the
5 fibre reinforcement in the resin layer is in
6 the form of filaments of in the form of
7 particles such as beads.

8

9 37. A material as claimed in Claim 35 or Claim 36
10 for use as or in a window.

11

12 38. A material as claimed in any one of Claims 35
13 to 37 to provide a laminated optically
14 transparent assembly comprising at least one
15 glass/resin/glass layer lamination, and having
16 one or more high tensile strength flexible
17 material reinforcement pieces extending
18 laterally from the resin to provide attachment
19 of the assembly to a surround.

20

21 39. An assembly or a material as claimed in any one
22 of Claims 1 to 20 and 35 to 38 wherein at least
23 one of any glass layer is toughened glass.

24

25 40. A transparent assembly having a transparent
26 panel and one or more high tensile strength
27 flexible material reinforcement pieces
28 extending laterally from the panel to provide
29 non-rigid attachment of the assembly to a
30 subframe and/or wall, in conjunction with a
31 wall-reinforcement assembly as claimed in any
32 one of Claims 26 to 30, wherein the assembly is

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- 1 secured to the reinforcement pieces of the
- 2 wall-reinforcement assembly.